Faculty Perception of an Embedded Research Project in the Undergraduate Veterinary Curriculum

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ABSTRACT
In this article, we describe faculty perception of a research project (RP) embedded in the final year of the undergraduate veterinary curriculum and look at factors associated with overall perception of the project. It was hypothesized that faculty have a dichotomous attitude toward the research project with faculty either viewing it positively or negatively, and this opinion of the project would be largely influenced by the background of the faculty member, in particular, their role at the RVC. This hypothesis was explored via a questionnaire consisting of 26 questions in categorical format, Likert-scale format, and multiple ranking questions that discussed faculty demographics, faculty perception of the embedded project, and generic skills. Faculty had an overall positive view of the project and found it to be a useful part of the undergraduate curriculum (83.3% of faculty found it to be useful or very useful). Faculty's perception of the project was influenced by their role at the college ($p = 0.017$), the species they primarily work with ($p = 0.05$), and their opinion on time spent supervising the final year project ($p = 0.003$). This report concludes that faculty view research to be an important and useful part of the undergraduate veterinary curriculum.

KEY WORDS
Faculty perception, undergraduate education, research project, veterinary

INTRODUCTION
Veterinary research serves as the interface between science (including basic science, biomedical science, and social science) and animal and human health and is essential for improving and facilitating advances in One health medicine[1]. In today's society, the public has high expectations for protecting human and animal health and finding treatments for emerging and ongoing diseases. Due to these high expectations, there is urgent need to provide adequate resources and training programs at veterinary institutions in order to facilitate veterinary research [1, 2]. This need for implementing research in training programs is critical as the number of veterinary scientists and researchers has slowly been declining and now there is a current shortage of veterinary researchers. This shortage has been found to be due to several reasons, including a declining interest in research among veterinary students, challenges recruiting scientists into research and teaching posts at universities, as well as retention issues due to faculty leaving academic positions to enter private practice [2-5].

Veterinary students have a wide array of career options post-graduation, however the majority of students are primarily interested in clinical practice, and a career in research is not widely considered [1]. In order to obtain more veterinary researchers from the graduate pool, the veterinary curriculum should contain direct research experiences in order to encourage consideration of a research career. Involvement in research experiences does not necessarily correlate with increased likelihood of a later research career [6], however it can lead to positive experiences for students that may spark interest in the profession. In medical students, it was found that a positive research experience and a supportive mentor lead to a consideration of a future research career [7]. Thus, if compulsory research experiences are included in the veterinary curriculum, good supervision and mentoring is needed in order to sway students to a research career [8].

In this study, we will look at faculty's perception of a compulsory research project embedded in the final year curriculum of the Bachelors of Veterinary Medicine (BVetMed) course at the Royal Veterinary College (RVC) and compare these perceptions to student perceptions of the research project, found in a published earlier study [9]. The earlier published study found that the majority of students had a positive attitude toward the research project after

completion and this attitude was correlated with perceived difficulty of the research project, perceived quality of supervision, as well as perceived supervisor enthusiasm. In addition, this study found that even though students had an overall positive view of the project, the majority of students thought that the time spent on the project would be better spent on something else. Finally, although students would prefer to spend their time on something other than the research project, the majority of students would do the project if they were theoretically given the option to obtain a Master's Degree upon extension of the project by a month (in the United Kingdom a Master's Degree can be obtained during or after a five year veterinary degree. A Master's degree involves a research project relative to the size of this research project and thus a proposal was made that a Master's degree could be obtained from the project, if students had slightly more time to complete, finalize, and publish their research).

Eight weeks of the final year BVetMed Course at the RVC are allocated for student research. During this time, students must undertake a research project of their choice in which they design the experiment, collect and analyse data, and write a report detailing their project and results. The aim of this project is for students to gain experience in reading, understanding, and using research data allowing them to gain skills in evidence based veterinary medicine (EBVM). A few essential EBVM skills students gain from this include forming a clinical question, critical thinking, and analytical ability. During their project, students identify a faculty supervisor for their project who is either a full-time researcher, a full-time clinician in the on-campus referral hospital, or is both a clinician and researcher. The supervisor assists and advises their students on all aspects of the project including study design, data collection, data analysis, and editing of the final report. The supervisor is expected to remain in contact with their student throughout the duration of the project. The rest of the final year of the BVetMed course at the RVC consists of 28 weeks of Intra-Mural Rotations (IMR) conducted in the university teaching hospitals or associated clinics and 16 weeks of Extra-Mural Studies (EMS) where students organize to see veterinary practice at practices of their choice.

This study aims to determine faculty's overall attitude as well as perceived importance and usefulness of the embedded research project in the undergraduate curriculum. In addition, in the discussion this study will compare faculty's perception to student's views of the research project.

It was hypothesized that faculty have a dichotomous attitude toward the research project with faculty either viewing it positively or negatively, and this opinion of the project would be largely influenced by the background of the faculty member, in particular, their role at the RVC.

MATERIALS AND METHODS

Study Overview

This study surveyed academic faculty at the Royal Veterinary College, London, United Kingdom in 2013. Academic faculty actively involved in teaching veterinary students at the RVC were emailed and requested to complete an online questionnaire via SurveyGizmo. Participation in the study was voluntary and all responses were collected anonymously. Ethical approval was given by the RVC Ethics and Welfare Committee.

Questionnaire Design

The survey consisted of 26 questions, 18 of which discussed faculty perceptions of the embedded research project, two discussed generic skills, and six were demographic

questions. Of the questions asked 11 were categorical questions, seven were in Likert-scale format, two were ranking questions, and six were open format questions. The questionnaire was developed on the basis of interviews conducted with 8 faculty members and edited after testing the original draft on 12 members of faculty, taking their feedback into account.

Demographics

Demographics of faculty were explored via six questions. Faculty were asked to note down their gender, age, nationality, and role at the RVC (clinician, researcher, or combination of both). Faculty ages were split into three groups (30 and below, 31 – 44, and 45 and above) for categorization before statistical analysis. Faculty were asked to relate their research background and what species they primarily work with.

Faculty Involvement in the Final Year Research Project

Faculty were asked if and how long they have been involved with supervision of the final year research project (this was split into three categories for data analysis; 0-5 years, 6-10 years, and more than 10 years of involvement), what other categories of students they have supervised for research projects, and how many publications have arisen from final year student projects they have supervised.

Faculty Perception of the Research Project

The attitudes of faculty toward the final year research project were assessed by asking them about the general usefulness of the research project in the BVetMed curriculum, their opinion on the time allocated to the final year RP, if they thought the time spent doing the research project would be better spent on something else, and an alternative option if they thought the research project should be spent doing something else. Faculty opinions about supervising the final year research project and how it contributed to their workload was assessed and their contact time and email response time to their research students were assessed by categorical questions.

Faculty Perception of Student Attitude Toward Research

Faculty were also asked about what they thought students' opinions of the research project were. This was assessed by asking faculty how they thought the majority of students felt about their final year research project, how difficult they thought students found the project, and asking how much effort they thought students put into their research project in comparison to other components of final year.

Faculty Perception of Generic Skills

Faculty's perception of importance of generic skills for veterinary graduates were assed via a four-point Likert scale. Faculty's perception of contribution of final year components to generic skills were assessed by asking faculty to rank on a scale of 1- 4 (one being detrimental, and four has contributed in a major way) how much EMS, IMR, the Research Project, and free-study contributed to the development of generic skills in students.

Data Analysis

Data distribution was assessed using histograms and Kolmogorov-Smirnov tests. Cronbach's alpha coefficient was used to test the reliability of the survey. Kruskal-Wallis tests were used to determine differences in overall opinion of the project and the usefulness of the different components, contact time with students, and email response times in relation to job role of the faculty. Kruskal Wallis tests were also used to compare faculty's opinion of the project with the species they primarily work with as well to compare faculty's overall opinion of the

project with faculty's opinion on the time spent supervising the final year research project. Spearman's Rho was used to determine correlations between number of students supervised and number of publications. Correlations between faculty contact time with students and their overall opinion of the project were calculated using Spearmans rho. The p value was set as < 0.05 for all tests. Data was entered into a Microsoft Excel spreadsheet and data analysis was performed in SPSS.

RESULTS

Faculty Demographics

Out of 144 respondents 66 faculty members fully completed the questionnaire. Of the complete respondents, 35 (53.0%) were female and 31 (46.9%) were male. The respondents' ages ranged from 25 to 61 with a mean age and standard deviation of 40 ± 8.5 years. Of the respondents, 42 (63.6%) were British, and the rest identified themselves as international faculty. Of the respondents, seven (10.6%) identified themselves as full time clinicians, 13 (19.6%) were full time researchers, 21 (31.8%) worked as both researchers and clinicians, and 24 (36.3%) identified themselves as 'other' (namely as PhD students and interns). Forty-one percent of the respondents primarily worked with small animals, 21% worked with farm animals, 18% with equine, 5 % with exotics, and 15% specified other, in which the responses included pathogens, mixed species, humans, and wildlife.

Faculty Research Background and Final Year Research Project Involvement

Forty-five of the 66 faculty members (68.1%) indicated they had a PhD and 20 (30.3%) had a Master's degree. Of the 66, 40 (60.6%) had experience in research, having five or more papers in peer reviewed journals, 15 (22.7%) had limited experience in research having four or less papers in peer reviewed journals, and two (3.0%) had no research experience having no papers in peer reviewed journals.

Involvement in final year research projects as supervisors ranged from zero to 24 years, with five respondents having never supervised to one respondent having supervised for 24 years. The average time spent supervising research projects was 5.8 ± 5.5 years (Median = 4.00 with interquartile ranges of 2.00, 4.00, and 7.25). The majority of respondents (56%) had supervised student research projects for two to six years. Faculty involved with supervising student research projects had supervised between 1-80 projects with the majority of faculty (54.2%) supervising between one to ten projects. Thirty-four-point eight percent of respondents had supervised between 13 - 80 projects and 10.6% of respondents had not supervised any projects. The faculty involved with supervising the research project had an average of 2.36 research students per year. A positive correlation was found between how many final year projects faculty had supervised and the number of publications arising from final year projects ($p < 0.001$) ($\rho = 0.567$).

The majority of respondents (51.5%) felt that the time they put towards supervising final year project was just right, whereas 33.3% of respondents would like to have more time supervising if their other commitments would allow it, and 15.1% indicated that they would like to spend less time supervising final year projects.

Fifty-four percent of faculty had an average response time of 24 hours to student emails about their final year research project, whereas 39.4% took one to three days to respond to student emails and 4.5% of faculty took four to seven days to respond. No significant difference was found between faculty email response time and faculty role at the RVC ($p = 0.077$, $H = 6.837$) or overall opinion of the research project ($p = 0.523$, $H = 1.296$).

Thirty-nine percent of faculty had on average less than 1 hour a week of contact time with their research student during their final year research project. A proportion of 42.4% had one to three hours a week of contact time, 12.1% had four to six hours a week of contact time, 3% spent seven to eight hours a week in contact with their student, and the last 3% spent more than eight hours a week in contact with their research students. No significant difference was found between faculty contact time with students and faculty role at the RVC ($p = 0.858$, H = .766) or overall opinion of the research project ($p = 0.433$, H = 2.745).

Faculty Attitudes Toward Research in the Undergraduate Curriculum

Table 1 shows the distribution of responses for the usefulness of the project overall as well as the project's individual components. Overall, 50% of respondents felt that the research project as part of the undergraduate curriculum was useful, whereas 33.3% of respondents thought it was very useful, 4.5% were indifferent, and 12.1% thought it was useless. Respondents felt that the write-up portion of the research project was the most beneficial part of the project followed by data analysis and literature reviews. Respondents felt that the study design and data collection portions of the project were the least beneficial. No difference in scores was found between faculty age, gender or length of involvement with the research project, or previous research experience with their overall opinion of the research project, however a difference was found between faculty role at the RVC and overall opinion of the project ($p = 0.017$, H = 8.203). Full time researchers (mean perception score = 4.46 ± 0.52) or researchers/clinicians (mean score = 3.57 ± 1.08) found the project to be more useful than those who worked just as clinicians (mean score = 3.42 ± 0.98). In addition, a significant difference between overall attitude of the usefulness of the project and the species faculty primarily work with was found ($p = 0.05$, H = 9.494). The faculty who primarily worked with farm animals, found the project to be most useful (mean = 4.42 ± 0.51), those that worked with small animals found it to be slightly less useful (mean = 3.78 ± 1.05), and faculty that worked with equids, found the project to be the least useful (mean = 3.75 ± 1.14). Faculty's overall opinion of the usefulness of the project was also found to be significantly different (p=0.003, H = 11.677) with faculty's opinion of their time spent supervising the final year project. Faculty who thought the time they spent supervising the research project was either just right (mean = 4.35 ± 0.64) or they wanted to spend more time supervising if the time allowed it (mean = 4.04 ± 0.90), felt the project was more useful. Faculty who wanted to spend less time supervising the final year project, found the project to be less useful (mean = 2.89 ± 1.17). (Place Table 1 here).

Faculty Opinion on Time Allocation

The majority of respondents (71.2%) felt that the time allocated to the final year research project was adequate, whereas 19.7% felt it was too short, 4.5% felt it was much too short, and 4.5% felt that the time allocated was too long. When asked if the time allocated to the final year research project would be better spent on something else, 75.8% responded no, 21.2% felt that it should be spent on something, and 3% did not know. The 21.2% of respondents that felt that the time would be better spent on something else, thought the time should be used for extra-mural studies, intramural rotations, or more classroom teaching. When asked if extending the final year RP for another month if students would gain a Masters in Veterinary Science was a good idea, respondents had mixed opinions. Forty-five and a half percent felt that it would be a good idea but conversely, 54.5% thought it was a bad idea. When asked where the extra time would come from if the research project was extended by a month, ten respondents thought the project should be completed during the

time between finals and graduation or the final year should be extended. Five individuals thought IMR time should be shortened, four preferred EMS time to be shortened, and nine thought the classroom component of the course should be shortened.

Faculty Perception of Student Attitude Toward Research

Table 2 shows faculty perception of students' opinion of the research project. The majority (42.4%) of respondents felt that most students thought their final year research project was 'okay' whereas 31.8% felt that students did not like the project, 15.2% thought students really enjoyed the project, and 10.6% thought students were indifferent. Most faculty thought that students liked the data collection portion of their project the most and least enjoyed the data analysis and write-up parts of their project. Most faculty were in agreement that they think students either do not like the project (31.8%) and its different components or they think it is 'okay' (42.4%). Not many faculty felt that students hated the project, really enjoyed it, or were indifferent about it.

Table 3 shows the distribution of faculty perception of student's perceived difficultly of the final year research project. Most faculty (60.6%) believed that students found their project difficult and 34.8% thought that students found the project neither difficult nor easy. Faculty thought that students found the data analysis portion of their project most difficult followed by study design and write-up. Faculty thought that students found the data collection and literature review portions of their project to be easier.

When faculty were asked if they thought students would extend their research project for another month if they were to gain a Masters in Vet science from it, 60.6% of faculty responded 'no', and 39.4% responded 'yes'. Those that responded 'yes' were then asked where student would suggest the extra time for the research project would come from. Eleven individuals thought students would suggest the classroom component of the course be shortened, eight thought students would want the final year to be extended, seven believed students would want EMS time to be shortened, six responded students would want to use the time between finals and graduation, and two thought students would want time on intra-mural studies to be shortened. (Place Table 2 and 3 here).

Faculty Perception of the Importance of Generic Skills and the Contribution of Components of the Final Year Course to the Development of Generic Skills

(Place Table 4 here) Faculty judged oral communication skills to be the most important generic skill for a veterinary graduate to possess. Oral communication skills was given a mean score of 3.95 ± 0.37 (1 being completely unimportant and 4 being very important). This was followed by problem solving (3.83 ± 0.51) and teamwork (3.79 ± 0.51). The skills designing experiments (2.23 ± 0.70) and statistics (2.45 ± 0.73) were deemed the least important for veterinary graduates. Researchers found the skills 'information gathering' ($p = 0.049$, $H = 7.871$), 'information evaluation' ($p = 0.014$, $H = 10.669$), 'critical thinking' ($p = 0.03$, $H = 8.718$), and 'designing experiments' ($p = 0.003$, $H = 14.298$) to be more important than clinicians or clinician/researchers. (Place Table 5 here).

Compared to other components of the final year course, faculty felt the research project contributed most to written communication skills, information gathering, evaluating information, statistics, ability to work independently, management skills, time management skills, problem solving, and critical thinking. The research component of the course contributed the least to oral communication skills and teamwork. When determining if there were any significant differences in the data, it was found that researchers and

researcher/clinicians felt the research project contributed more to written communication skills than full-time clinicians ($p = 0.043$, H = 8.171).

DISCUSSION

In this study, we assessed faculty perception of an embedded research project in the undergraduate curriculum and compare these perceptions to student views of the project found in an earlier study. Overall, most faculty felt that the research project as part of the final year course at the RVC was useful and should remain part of the curriculum.

Comparison of Faculty and Student Perception of the Research Project

Faculty's perceptions of the embedded research project were compared to student perceptions of the project found in a previously published study[10]. Overall, faculty and students were in agreement regarding most opinions of the research project. The following agreements were found: the time allocated to the project was adequate, faculty overall opinion of the project and student opinion after completion of the project, faculty's view of student opinion of the project and student's actual opinion, and the difficulty of the project overall as well as its components. These corresponding views are a positive finding, as it reveals that faculty are aware of student opinion as well as the difficulty of the project, and thus will be better able to provide correct mentoring and support to their research students.

Besides the overall corresponding views of the project, a few differences were found between faculty and student perceptions of the project. When asked if the time spent on the research project would be better spent on somethings else, faculty and students disagreed. Students felt the time would be better spent on something else, whereas faculty felt the opposite. Another difference between faculty and student opinions was in their view of extending the research project if a Masters in Vet Science would be obtained from it. An overwhelming majority of students would be willing to extend their project if they were to gain a Masters in it, whereas the majority of faculty thought the project should not be extended in order for student to obtain an extra degree [10]. An additional area in which faculty and student opinions differed, was their perception of the contribution of the different final-year components to the development of generic skills.. It is concerning that there are some differences in opinion between faculty and students as these differences might show a disconnect between faculty and students and show that faculty are no longer in-tune with student mind-sets, however these are direct comparisons and thus conclusions should not be drawn directly from these differences. More research is needed in order to determine the underlying reason for these differences in staff and student opinions.

Faculty Perception of Time Allocation

One of the important findings from this study was faculty's perception of the time they spend supervising final year projects. The majority of respondents felt that the time they put into supervising final year research projects was just right or they would like to spend more time supervising. Some faculty however, would have liked to spend less time supervising. It is encouraging that most faculty are happy with the amount of time spent supervising as it shows they are able to cope with their regular workload as well as supervise their research students, however, with the increasing size of the veterinary classes at the RVC [11], some of these factors are slightly concerning. At the time of this study, the veterinary class size was under two-hundred students, however in two years' time, the final year class size will be over 300 students. At the time of this study, faculty members were primarily happy with the amount of time they spent supervising projects, in light of the rest of their workload. However with increasing class sizes, each faculty member may now have to take on more

students, and consequences may arise. With their normal workload plus additional research students each year, faculty may not have as much time to spend advising and mentoring each student and email response times may increase and contact time with students may decrease. It has been seen that a supportive mentor has a strong influence on students and their research productivity, and thus if students are to be swayed toward a research career, faculty supervisors need to be present and supportive [12-14]. In 2013 when the student study was conducted, the majority of students rated the quality of supervision for their project as either good or excellent, however, a small percentage thought the supervision was terrible or non-existent [10]. The majority of these ratings are excellent, however if class size increases and the quality of supervision decreases, student opinion of the project may fall and student achievement and productivity may decrease as well. These concerns over the quality of education with increasing class size are echoed by many, including members of the British Veterinary Association [15]. As demonstrated by others [16, 17] students who felt supported by teaching faculty and who found them helpful, sympathetic, and available were more engaged with their higher education studies. In addition, students who had more frequent interactions with faculty had higher levels of engagement and satisfaction. Furthermore, it has been found that teaching faculty who have regular contact with students are more attuned to students and are better able to understand student perspectives and are better able to meet student learning needs[16, 17]. In order to maintain student enthusiasm and interest in research at its current level, quality of supervision of the research project must not decrease[14]. Thus, if veterinary education class sizes keep increasing, the feasibility and administration of the research project must be reviewed.

Review of the Research Project

Besides looking at the feasibility of this project, the overall future of this project should be reviewed. With not all students having a positive view of the project and the possibility of faculty struggling to maintain high quality of supervision, it may not be beneficial for the research project to remain in the undergraduate curriculum. Universities in the United Kingdom have the challenge of maintaining a high quality of education to their students as well as providing students with the experience and education that they desire, in order to score well on the National Student Survey (a survey completed by final year students which allows them to give feedback of their completed course which, in turn, helps the universities to shape the future of the course) [18]. If RVC students would prefer to spend their time on something other than the research project, the curriculum and this project may need to be reviewed in order to meet student expectations. In addition, the argument can be made that an embedded research project is a waste of valuable resources that could instead be invested into furthering student's clinical skills. However, these opinions and student expectations need to be balanced with the importance of the generic skills gained during research experience that are essential for practicing evidence-based veterinary medicine as well as fostering skills that will help graduates succeed not only in veterinary medicine but also in other professions.

In conclusion faculty perception of an embedded research project was influenced by several factors – faculty's role at the university, species they primarily work with, and their opinion on the amount of time spent supervising projects. In order for an embedded research project to remain successful at helping recruit students into research, faculty need to have a positive opinion of the project and need to be supportive mentors who have regular contact with their research students.

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